The United States has ratified this STANAG and it is approved for use. Actual promulgation by NATO is expected within one year. At that time, this document will be replaced by the promulgated version. Any U.S. comments or reservations are included in the following letter.

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON DC 20301-3000

ACQUISITION AND
TECHNOLOGY

June 10, 2002

MEMORANDUM FOR U.S. MISSION TO NATO, ARMAMENTS COOPERATION DIVISION
(ARMY ARMAMENTS OFFICER), PSC 81, APO AE 09724

SUBJECT: Draft STANAG 4396 (EDITION 2) – "SYMPATHETIC REACTION, MUNITION TEST PROCEDURE "

Reference document, AC/310-D/196, 12 December 2001, SAB.

The U.S. Armed Forces ratifies the referenced agreement.

Ratification and implementation details are as follows:

	IMPLEMENTATION					
	Forecast Date			Actual Date		
RATIFICATION REFERENCE	NAVY	ARMY	AIR FORCE	NAVY	ARMY	AIR FORCE
Memo, OUSD(A&T) DATED AS ABOVE	June 10, 2002			June 10, 2002		

NATIONAL IMPLEMENTING DOCUMENT: MIL-STD-2105C

RESERVATIONS: None

COMMENTS: See attached DA Form 4797-R.

The point of contact is Mr. James E. Elliott, DSN 880-3047, commercial (973) 724-3047.

Anthony J. Melita
U.S. Key Delegate
AC/310 Main Group

CF:

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Doctrine Division (C426), Marine Corps Combat Development Center, 3300 Russell Road, Suit 318A, Quantico, VA 22134-5021

HQUSAF/SAF/IAQ, 1500 Wilson Blvd, 9th Floor, Arlington, VA. 22209

Mr. R. Sladden, Armaments CO-Operation Section, Defence Support Division, NATO Headquarters, Avenue Leopold III, 1110 Brussels, Belgium

Comments to STANAG 4396E2

NO (a)	NATION (b)	PAGE (c)	PARA (d)	LINE (e)	COMMENT(S) (f)	REASON(S) (g)
1	U.S.	5	10.a.	2	**COMMENT:** Change the reference to the UN Test from ''6_c and 7_g'' to ''6_b and 7_k''	Accuracy. The current references are incorrect.
2	U.S.	5	12	1	**COMMENT:** Add the following to the start of the sentence, ''Except where noted, as a ..''.	Two of the observations listed are not mandatory for all tests.
3	U.S.	6	12.g.	1	**COMMENT:** Change to read, ''Blast pressure records (strongly recommended for unconfined tests only)''	Data records are not of any use if the test articles are confined during the test.
4	U.S.	6	12.j.	1	**COMMENT:** Change to read, ''Fragment Map (not required or practical for confined test);	Fragment data is not meaningful if the test articles are confined.

REVERSE OF DA FORM 4797-R, DEC 88

Encl 1

NORTH ATLANTIC COUNCIL
CONSEIL DE L'ATLANTIQUE NORD

NATO/PfP UNCLASSIFIED

12 December 2001

DOCUMENT
AC/310-D/196

**GROUP ON SAFETY AND SUITABILITY FOR SERVICE (S3)
OF MUNITIONS AND EXPLOSIVES (AC/310)**

CNAD PARTNERSHIP GROUP (CPG)

RATIFICATION DRAFT 1 - STANAG 4396 (EDITION 2) - SYMPATHETIC REACTION, MUNITION TEST PROCEDURES

Memorandum by the Assistant Secretary General for Defence Support

(RATIFICATION REQUEST)

Reference: PfP(CPG-S/3-SG/3)DS/8 dated 30 November 2001

1. The Group on Safety and Suitability for Service of Munitions and Explosives, Sub-Group 3, approved, at reference, draft STANAG 4396 (Edition 2) for issue for ratification.

2. In line with the decision of the Group, the agreed text is herewith forwarded to delegations of NATO nations who are requested to obtain the national ratification by 15 June 2002. The delegations are asked to inform the Defence Support Division of their national Ratification references, together with a statement of the date by which national implementation is intended to be effective, using the ratification response form at Annex. The service or services within which the standard applies should be indicated.

3. Most national Ministries of Defence contain a standardization office or standardization liaison officer who can give advice on the procedure to be adopted to obtain a formal ratification reference. It is recommended that contact be made with that office.

4. As soon as sufficient ratifications have been received, this STANAG will be forwarded for promulgation.

(Signed) R. G. BELL

Enclosure: Stanag 4396 (Edition 2)
1 Annex

Action Officer: R. Sladden
Original: English
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ANNEX to
AC/310-D/196

STANAG 4396
(Edition 2)
(Ratification Draft 1)

NATIONAL REPLY ON THE RATIFICATION AND IMPLEMENTATION OF A STANAG

(National Reference and Date)

To : Assistant Secretary General for Defence Support
NATO/OTAN

Subject : STANAG 4396 (Edition 2) - RATIFICATION DRAFT 1 – SYMPATHETIC REACTION, MUNITION TEST PROCEDURES

Reference : AC/310-D/196 dated 12 December 2001

1. (*nation*) ratifies/does not ratify(*) the agreement received under cover reference.

2. Ratification and implementation details are as follows:

RATIFICATION REFERENCE AND DATE	**IMPLEMENTATION**					
	Forecast Date			Actual Date		
	NAVY	ARMY	AIR	NAVY	ARMY	AIR

3. NATIONAL IMPLEMENTING DOCUMENT(s):

4. RESERVATIONS:

5. OTHER INFORMATION:

.....
(Signature block)

(*) Delete as appropriate

Enclosure to
AC/310-D/196

STANAG 4396
(Edition 2)
(Ratification Draft 1)

NORTH ATLANTIC TREATY ORGANIZATION
(NATO)

NATO STANDARDIZATION AGENCY
(NSA)

STANDARDIZATION AGREEMENT
(STANAG)

SUBJECT: SYMPATHETIC REACTION, MUNITION TEST PROCEDURES

Promulgated on 2001

Jan H ERIKSEN
Rear Admiral, NONA
Director, NSA

Enclosure to
AC/310-D/196

STANAG 4396
(Edition 2)
(Ratification Draft 1)

RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Director, NSA under the authority vested in him by the NATO Military Committee.

2. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.

3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. Ratification is "In NATO Standardization, the fulfilment by which a member nation formally accepts, with or without reservation, the content of a Standardization Agreement" (AAP-6).

5. Implementation is "In NATO Standardization, the fulfilment by a member nation of its obligations as specified in a Standardization Agreement" (AAP-6).

6. Reservation is "In NATO Standardization, the stated qualification by a member nation that describes the part of a Standardization Agreement that it will not implement or will implement only with limitations" (AAP-6).

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

7. Page (iii) gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the tasking authority of its intentions. Page (iv) (and subsequent) gives details of reservations and proprietary rights that have been stated.

FEEDBACK

8. Any comments concerning this publication should be directed to NATO/NSA - Bvd Leopold III, 1110 Brussels - BE.

Enclosure to
AC/310-D/196

STANAG 4396
(Edition 2)
(Ratification Draft 1)

RATIFICATION AND IMPLEMENTATION DETAILS
STADE DE RATIFICATION ET DE MISE EN APPLICATION

NATION / PAYS	NATIONAL RATIFICATION REFERENCE REFERENCE DE LA RATIFICATION NATIONALE	NATIONAL IMPLEMENTING DOCUMENT DOCUMENT NATIONAL DE MISE EN APPLICATION	IMPLEMENTATION/MISE EN APPLICATION					
			INTENDED DATE OF IMPLEMENTATION DATE ENVISAGEE DE MISE EN APPLICATION			DATE IMPLEMENTATION WAS ACHIEVED DATE EFFECTIVE DE MISE EN APPLICATION		
			NAVY MER	ARMY TERRE	AIR	NAVY MER	ARMY TERRE	AIR
BE								
CA								
CZ								
DA								
FR								
GE								
GR								
HU								
IT								
LU								
NL								
NO								
PL								
PO								
SP								
TU								
UK								
US								

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(Ratification Draft 1)

RESERVATIONS/RESERVES

Enclosure to
AC/310-D/196

STANAG 4396
(Edition 2)
(Ratification Draft 1)

NAVY/ARMY/AIR

NATO STANDARDIZATION AGREEMENT (STANAG)

SYMPATHETIC REACTION, MUNITION TEST PROCEDURES

Annexes: None.

Related documents:

AECTP-200	Environmental Testing – Definitions of environments.
AOP-38	AC/310 Glossary of Terms and Definitions Concerning the Safety and Suitability for Service of Munitions, Explosives and Related Products
AOP-39	Guidance on the Development, Assessment and Testing of Insensitive Munitions
STANAG 2895	Extreme Climatic Conditions and Derived Conditions for Use in Defining Design/Test Criteria for NATO Forces Materiel
STANAG 4123	Determination of the Classification of Military Ammunition and Explosives – AASTP-3
STANAG 4439	Policy for Introduction, Assessment and Testing for Insensitive Munitions.
United Nations document (UN) ST/SG/AC.10/11/ Rev 3/R.256	Recommendation on the Transport of Dangerous Goods Manual of Tests and Criteria.

AIM

1. To provide a standard test procedure to assess the potential for a munition to sympathetically react to the initiation of an adjacent munition.

AGREEMENT

2. Participating nations agree that the procedure incorporated in this STANAG will be used for determining the reaction, if any, of munitions to the reaction of a same type of munition in close proximity, and that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purpose of identification. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority, where they will be processed in the same manner as the original agreement.

LIMITATIONS

3. This document does not include the procedures for assessing the effects of the reactions of different types of munitions stored or placed in close proximity in regular logistic storage. If required, a suitable procedure could be developed from that given here.

DEFINITIONS

4. For the purpose of this document, the definitions of terms to be used to describe test events are provided in AOP-38 and STANAG 4439.

GENERAL

5. This test is one of those referenced in STANAG 4439 for Insensitive Munitions (IM) assessment. It may also be used for Hazard Classification (HC) as required by STANAG 4123 and United Nations (UN) document ST/SG/AC.10/11/ Rev 3/R.256, and other applications not covered by these STANAGs. When intended to satisfy both IM and Hazard Classification (HC) requirements, the test plans should be coordinated with appropriate authorities in these two areas.

6. Munitions are often positioned in adjacent locations, either in a magazine, on a launching ramp, or during the operational weapon system deployment. In such conditions, a reacting munition (donor) may transmit blast, shock, flame, fragments, or other debris, to other munitions (acceptor) stored in the vicinity. If these other munitions or packages of munitions can be initiated by any of these effects, the consequences of the event could be catastrophic, resulting in potential loss of life and equipment.

DETAILS OF THE AGREEMENT

7. Purpose. The purpose of this test to:

a. subject one or more acceptor munitions to the effects of the worst case credible reaction of an identical donor munition, in the in-service situation assessed to be the most likely to result in sympathetic reaction. (For Hazard Classification (HC), this is generally the storage and transportation situation.)

b. determine the sympathetic reaction sensitivity of munitions.

c. provide an indication of the effectiveness of safety barriers or other devices used to separate either single, packaged, or multiple packages of munitions.

8. Sample Selection

a. The test items should be in their storage/transport configuration, but in the smallest configuration (smallest individual package) offered. The test requires sufficient packages or articles to give a minimum total volume of 0.15 m^3, with a minimum of one donor and two acceptor packages. The munition(s) shall be separated from its neighbours by a distance determined from logistics requirements.

b. Donor and Acceptor Munitions. The test items (donor and acceptors) must be to the full production standard, although non-explosive sections of the items need only be geometrically and thermally representative. For all-up rounds that contain more than one major energetic component (such as rocket motors and warheads), the energetic components may be tested either individually or as an all-up round. Where both donor and acceptor munitions contain subsystems and assemblies that may be assessed as not enhancing the explosive reaction, consideration may be given to their replacement by less costly material, providing that output, fragmentation, and debris production are similar for the donor munition, and that acceptor munitions do not become less susceptible to the effects produced by the donor munition. For Hazard Classification (HC) purposes, test the configuration to be hazard classified.

c. Inert Acceptor Munitions. Where stacks of munitions, unpackaged or packaged, are to be used, explosively inert munitions other than donor and acceptor munitions, may also be used to obtain a reasonable simulation of confinement. The structure, mass and shape of these inert munitions should be similar to those of donor and acceptor munitions. The inert items used for confinement cannot be used to meet the 0.15 m^3 volume requirement of paragraph 8.a.

9. Choice of Test Parameters

a. Initiation Considerations.

(1) If designed to detonate, detonate the donor in the design mode.

(2) For rocket motors and gun propellants, initiate the donor with a credible threat (for example, Shaped Charge Jet (SCJ)) that produces the worst case donor reaction.

(3) For all others, use the normal means of initiation.

Note: The test is generally not required for IM if the item will not detonate.

b. Number and Layout of Munitions.

(1) In the case of a storage stack, the donor munition should be surrounded by the acceptor munitions, with similar but inert munitions providing the outer containment. The volume of the stack must be at least 0.15 m^3 minimum. If the volume of the donor and one acceptor package exceeds 0.15 m^3, two acceptors are required, but three are desirable. Where three acceptors are used, the arrangement should be such that two of them will be attacked diagonally in the most direct way (see Figure 1). Within a package, it is generally not acceptable to replace live items with inert items. Any plan to do so must be approved by appropriate authorities.

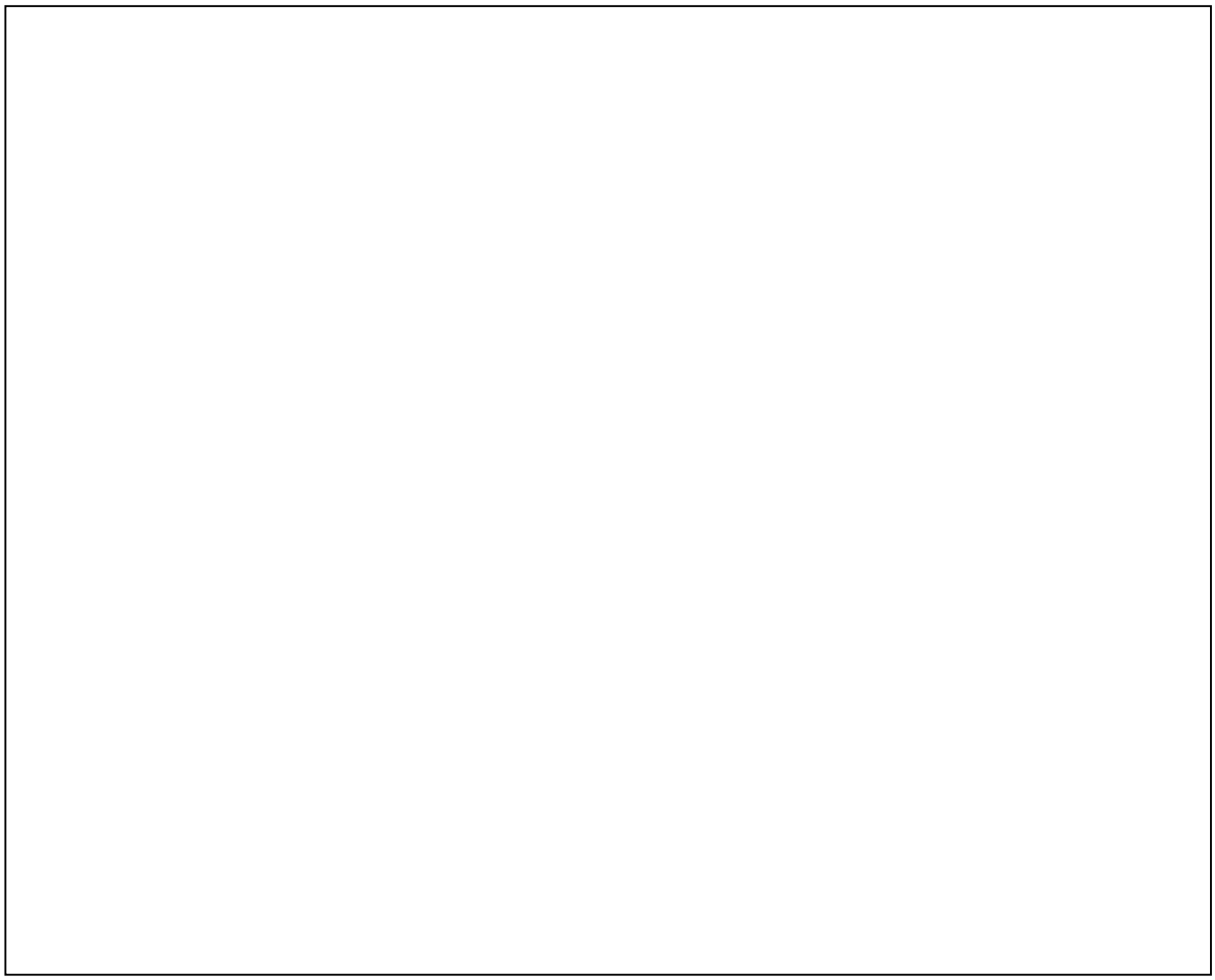
(2) Where protection devices are used (e.g., shields, screens, etc.) with the objective of reducing the likelihood of sympathetic reaction, they shall be included in the test configuration.

For (1) and (2) above, the configuration (confining and protection devices) could be determined by a Threat Hazard Assessment (THA).

(3) Two tests shall be performed - one with confinement and one without.

c. Preconditioning. Before subjecting munitions to test, preconditioning of munitions may be required where assessment shows that the preconditioning environment is likely to be a hot or cold temperature soak. The temperature values should be determined from the life cyle assessment and STANAG 2895 and AECTP-200.

d. Distance Between Munitions. The distance separating the donor and acceptor munitions shall equal the usual distance likely to be encountered in service, e.g., side by side for containers, actual distances for storage ramps, operational deployment distance for weapon systems.



e. External Confinement. Any confinement should represent that of a typical storage confinement. Confinement may be simulated with sandbags or sand/earth-filled containers stacked around the test stack at least 1m thick in all directions. If an existing external confinement is likely to alter the test result, the confinement should be simulated in the test. Both partial and complete confinement are possible, e.g., walls in two dimensions or an enclosed magazine. The latter can be simulated by a test structure for which the ratio of the volume of active and inert munitions to the volume of the test cell approximates that existing in the actual operationnal or storage configuration. Variations of up to 20% are acceptable. It is not appropriate to use inert items in the test arrangement simulating the unconfined situation, because they contribute to confinement without the possibility of reacting.

f. Test Organization. The items subjected to the tests in compliance with this procedure may show violent reactions resulting in fragment and debris. If it is assessed that the acceptor munition might become propulsive, appropriate restraining measures should be taken. The possibility of protective devices altering the test results as well as the quality of the measurements should be checked. The device used to support the test item should be the same as that existing in the operational or storage configuration and must not change the results of the test.

10. Assessment Criteria: Guidance is given in:

a. UN document ST/SG/AC.10/11/Rev 3/R.256, Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria (UN Tests 6_b and 7_k);

b. Stanag 4439, Policy for Introduction, Assessment and Testing of Insensitive Munitions;

c. AOP-39, Guidance on the Development, Assessment and Testing of Insensitive Munitions.

11. Instrumentation.

a. Cinematography: High speed cameras or video shall be used to record the reaction(s) of the acceptors. Care should be taken to prevent obscuration of the acceptor by the donor reaction products.

b. Video: Low speed recorders shall be used to cover any delayed reaction up to about 30 minutes after the donor has been fired.

c. Time markers: A timing device shall be used to provide correlation between recording processes.

d. Witness plates: Witness plates should be placed near test items to provide an indication of the acceptor reaction. The witness plates should be made of a material which is likely to record the impact of the fragments from a detonation. Steel or aluminium are usually used. Ideally the witness plate should be calibrated by exposing it to the detonation of a test munition.

e. Air blast presssure: Pressure gauges may be used to measure the air shock. The transducers should be placed in arrays some distance from the test configuration; they may be in ground or in elevated mounts. The fixtures shall not interfere with the air flow. Precalibration shall be considered if external sensors are used.

f. Fragment evaluation: Methods to determine the size, density and kinetic energy of fragments may be used.

12. Observations and records. Except where noted, as a minimum, the following observations are to be made and reported in the test report:

a. Test identification (model, serial number, etc.);

b. Type of energetic material and weight;

c. Photographs of the test setup;

d. Listing of environmental preconditioning tests performed;

e. A record of events versus time through the end of the trial;

f. The nature of any reactions by the test item, including indication of propulsion;

g. Blast pressure records (strongly recommended for unconfined test only);

h. Photographs of after test residue and debris;

i. Photographs of witness plates;

j. Fragment map (not required or practical for confined test);

k. Number and depth of penetrations in fragment recovery panels (if used);

l. High speed video and sound track.

IMPLEMENTATION OF THE AGREEMENT:

13. This STANAG is considered to be implemented by a nation when that nation has issued the necessary orders/instructions:

a. that all future munitions and weapon systems will be assessed/tested in accordance with this agreement,

b. to provide its NATO forces with the details in this agreement with reference to this STANAG.

14. Data developed in accordance with this STANAG shall be made available to other NATO Nations participating in a collaborative weapon development or procurement program upon receipt of a request submitted through appropriate National channels.